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ARA- A VOICE ASSISTANT FOR DISABLED PERSONALITIES

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Abstract: **This paper illustrates the implementation of our proposed voice assistant that provides assistance to disabled personalities over the website. ARA-the voice assistant is a software agent that can interpret human speech and respond via synthesized voices. The most popular voice assistants are Siri, Alexa, Cortana, and Google Assistant, which can all be found on smart phones and dedicated speakers. As voice assistants become more widely used, but have complex functionality and only open when we click the mic option, this will start on voice command, easier for the people who are blind or have cognitive disabilities. ARA will read out the content of the website and then using speech to text and text to speech modules along with selenium, our software can automate any website. The designed voice assistance connects with the intended applications to provide results that the user has demanded. The objective of this paper is to illustrate how voice assistants are used in everyday life and to explore whether there is potential for making them accessible for people with disabilities.**

Keywords: **artificial intelligence, machine learning, voice assistants, speech recognition, cognitive disabilities.**

I. INTRODUCTION

Voice assistants have a very long history that dates back over 100 years, which is surprising since Siri, the first one that we are aware of, was only released ten years ago and now we can see AI at work every day in the form of virtual personal assistants, which are embedded in almost every smartphone today. It is no wonder that voice assistants are gaining popularity at an incredible rate, becoming more relevant to providing great, yet effortless customer service. In order to provide contextual, real-time solutions, they are becoming more adept at decoding queries.

The basic idea of taking an artificial voice assistant into the picture is that it is a voice robot, which is somewhat different from the natural human voice and reacts according to the command. It is no longer a human who learns to communicate with a machine, but a machine learns to communicate with a human, prospecting his actions, habits, behavior, and trying to become his personalized assistant.

Worldwide, 15% of the population has some form of disability, of which 2-4% have significant difficulties with their functioning [10].

The task of using a website can seem trivial to most people, but it can be extremely difficult for people with disabilities. Because the internet is a highly visual form of communication, various "accessibility blockers" can inhibit different types of websites, unlike brick and mortar businesses, where accessibility can be achieved by installing ramps for wheelchairs or braille interfaces.

As a result, we wanted to develop a way that would allow different types of people to access the internet in a unique way.

II. LITERATURE SURVEY

To show the effect of web barriers and the broader benefits of accessible websites and web tools, W3C [12] told the stories of various people with disabilities who use the web. We came to know about the challenges faced by these disabled people and came to a conclusion where we wanted to make a user-friendly system taking their commands in the form of inputs and accomplishing the tasks in the form of output which proved out to be a boon for these people[11]. For better understanding of how effective these voice assistants are, each parent and child pair were interviewed in order to capture their view of the experience using the smart speaker. Analysis of the results showed that 89% of children's questions were transcribed correctly, although only 50% of children's questions received a full answer [13].

To build voice assistants various python modules such as pytssx3, website modules, speech recognition etc were installed [2, 4, 5].

III. PROPOSED SYSTEM

Human beings assist one another under many conditions, which coined a situation where a computer assists humans and helps in either way to become more intelligent than humans. So a disabled person wanting some sort of assistance to be self-reliant and smart from colleagues leads to artificial intelligence. The agent then has to interpret the request the person is making, together with relevant context, and then carry out relevant actions. This is an example of a

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passive agent since it does nothing until activated by a person. An artificial agent identifies a situation in which a person needs assistance, without even being aware of the need, this is an active agent since it does not have to be activated by a request from a person [1].
The user will provide the commands he wants to execute as a voice input instead of using a keyboard. The software then uses a speech to text module to convert the input speech to text which will be the command to be executed. Once executed the user will have three options: either to read the entire content of the website, read a summary or ask a question. Thus, the software manages to make the internet more accessible easily, quickly and more effectively for the visually impaired.

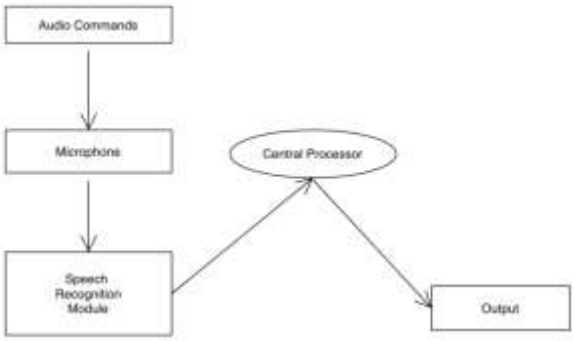


Fig1.1 Basic Workflow of ARA

IV. IDEA AND WORKFLOW

Voice Assistants provide a direct answer with minimal effort but with limited insight, while screen readers and search engines provide the opportunity to review several different resources. A system like the one proposed was developed from the real life scenarios encountered during our visit to an NGO where people were having problems accessing resources on the internet. They require constant supervision to access different resources, while having an assistant which gives them a sense of independence would make them feel more self-reliant and proud.

How do differently abled and visually people use laptops?
Having a visual impairment doesn't mean that they can't use a phone or laptop, it's a lifeline for many blind and visually impaired people. They can use mobile phones just like sighted people, they just use accessibility features to enable them to do so.

1) Wakeup Word Detection Module
This module is used to wake up the voice assistant by the proposed wakeup word. If we call the wakeup word, voice assistance will start to listen for user commands. In this model the wakeup word is ARA. When you call this name the system starts to run and listen.

2) Take Command
This module is used to register the user command after being initialised by the wakeup word. Defining a function and taking command for the AI assistant to understand and to accept human language. The microphone captures the human speech and the recognizer recognizes the speech to give a response.

3) Google Translate
This module inhibits translation features in the proposed system and makes it user friendly according to the language. It is an unlimited python library which implements google translate API by converting the text into several languages such as English, Hindi, Tamil, French, German and many more so that it becomes user-friendly assistant.

V. METHODOLOGY

This section provides insights on how ARA will work on logical predicates to describe and abstract knowledge as queries, which then take different forms during conversation depending on its flow along with the set of techniques for improving the performance of automated voice search services intended for mobile users accessing these services over a range of portable devices [3, 4, 5].
Our proposed system is used to help differently abled people to have easy access to different features which would help them to add to their resources, these modules provide them to access speech to text conversion, translation, access to any result required over the internet, date and time, timer, web search and helping them to find a particular resource on the website.

A. Speech Recognition
This is mainly used for converting speech input to text. We're aiming to build an Application of voice assistant which is one of the most important things as the assistant recognizes your voice (which means what you want to say/ ask). The equivalent text is then received and fed to the central processor for the computer system to understand.

B. Python Backend
The python backend gets the output from the speech recognition module which we are using and then it identifies whether the command or the speech output is an Application Programming Interface Call, Context Extraction, or System Call. The output is then sent back to the python backend to render the user intended output for his convenience.

C. Text-To-Speech(TTS)
TTS or Speech Synthesis is a process where text is converted into a natural language voice pattern. It is a type of assistance provided by computers to humans that reads inputted text aloud, it takes words in the form of input and converts them into audio, very helpful for kids and adults

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who find it difficult to read, nowadays it works with nearly every personal digital device.

VI. DRAWBACKS

In earlier voice recognition devices, children were not considered; eventually, with advancements, the system was automated, but the voice and language of children are more complex and unpredictable than adults, which made these devices ineffective. It is important for voice recognition devices to take into account the many variables that are present in children's speech patterns, including language structure, voice pitch (that changes a lot as they get older), syntax, grammar, and pronunciation.

In the worst conditions, AI could bias machines in favor of or against specific people, with negative or unlikely outcomes. This could ultimately decrease social acceptance of the proposed system making it incompetent Programs cannot understand the context of language the way that humans can, leading to errors that are often due to misinterpretation as they are not as efficient and intelligent as humans are. When we talk to people, they decide what we say and give it meaning according to their perspective which is not the behavior shown by systems. Voice recognition software can do this but may not be capable of choosing the correct meaning as intended by human beings as they lack emotions and senses.

The issue of privacy arises from the fact that anyone with access to a voice activated device can ask it questions, gather information about the accounts and services associated with the device, and get it to perform tasks.

The disadvantage of digital voice assistants is that they are limited to high-speed networks. Without a 4G network, these virtual assistants will be difficult to maintain.

Recent research has shown that voice assistants will respond to commands delivered at ultrasonic frequencies. This would allow an attacker to approach a victim, play the ultrasonic command, and the victim's device would respond.

VII. RESULT

This is the user interface of our project.

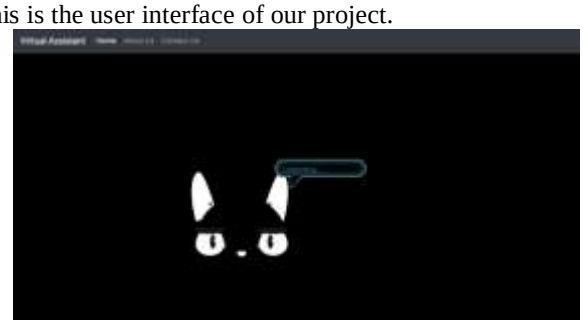


Fig 1.2 Outcome of code

After listening to the wake-up word the assistant gets activated.

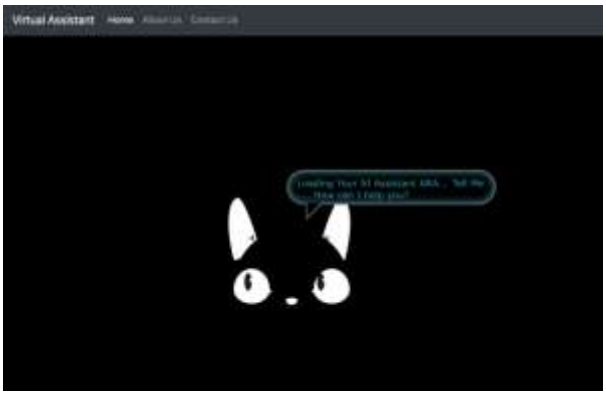


Fig 1.3 After listening wake up word

To facilitate the user the proposed system allows opening different applications just by using a voice command

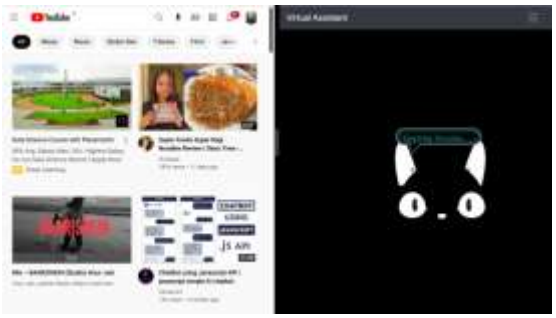


Fig 1.4 Assistant Opening Youtube on user demand

VIII. CONCLUSIONS

Voice Assistant helps the users with hand free voice control of their system. Speech recognition is the technology which provides a new way of human interaction with machines. It is very much helpful to the physically challenged people.

The proposed system is used to help the visually impaired to have access to the most important features of the system ,enhancing the quality of the system by making use of the different custom layouts and using text to speech.

It not only works on human commands but also gives responses to the user on the foundation of a query being asked or the words spoken by the user such as opening tasks and operations. It is addressing the user the way the user feels more enjoyable and feels free to interact with the voice assistant. The entire system works on verbal input rather than text.

In this modern world, more and more things can be performed online. From shopping, ordering food, to booking train tickets everything can be done online. For almost all of these online facilities a person has to use a website. Using a website can be a trivial task for most people but it is very difficult for visually impaired people.

IX. FUTURE ENHANCEMENT

As a result of the advancements in AI, Google and Microsoft have been able to make speech detection and language translation better than humans. These platforms have access to a huge amount of user data required for training the algorithms, and they continue to improve constantly.

With AI the possibilities are endless. We are beginning to see the emergence of many solutions for all people with disabilities that decades ago was only a dream. These assistive technologies now offer many possibilities to support independence for people with disabilities.

Humanizing conversations through AI is a top priority for companies. Brands will focus on equipping their voice bots with the ability to understand user intent and contextual factors before responding.

As of now, the application supports only the English language. We plan to expand that in the near future and make it available in more languages so that people from all over the world can access it easily.

It is important to develop as table software with as few keystrokes as possible and to provide an end-to-end experience using only voice commands. The software's dependence on the local environment and operating system is a crucial parameter for ensuring widespread use [2].

The read-aloud feature will be added to our virtual assistant in the near future so that people with disabilities can listen and retrieve required output they want from different web resources.

Currently, this model can be used with a PC. In the future, it can be implemented in all devices.

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